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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/583,970

06/22/2006

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22428 7590 09/23/2009  
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EXAMINER

WOOD, JARED M

ART UNIT

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1793

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/583,970	<b>Applicant(s)</b> YASUDA ET AL.	
	<b>Examiner</b> JARED WOOD	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 11-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-19 is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

Claim12 is objected to because of the following informalities: The first word of line 2 of claim 15 is misspelled. The word “ration” should be changed to “ratio”. Appropriate correction is required.

Claim15 is objected to because of the following informalities: The first word of line 4 of claim 15 is misspelled. The word “calthrating” should be changed to “clathrating”. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

**Claims 1-4 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,714,693 (Targos) in view of US 4,425,261 (Stenius et al.) and Training Papers Spray Drying (BUCHI Labortechnik AG, hereafter referred to as Buchi).**

**As to claim 1**, Targos teaches a method of making a catalyst composition where a reverse micelle emulsion used to provide isolated micelles of a metal ion containing solution (column 3 line 26) where the metal ions can comprise singly, or in any combination, group VIII metals such as platinum, ruthenium, and palladium (noble metals), group IB-VIIIB metals (transition metals such as Cu, Mn Co, Fe, Ni, and Zn), and Lanthanides such as lanthanum and cerium (column 5 line 25 and examples II-IV) **which also reads on claims 3, and 6-8**. The micelles are

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impregnated onto/into an inorganic oxide particulate carrier such as alumina (column 6 line 19) (to form a catalyst precursor) **which also reads on claim 4**. The new emulsion with the carrier particles is air dried and then fired in air to oxidize the residual organics and carbonaceous deposits from the solvent and surfactant(s) (column 6 line 42).

Targos does not expressly teach adding a reducing agent to the reverse micellar solution to reduce the noble metal precursor to a noble metal particle or spraying the catalyst precursor in an inert gas to dry the catalyst precursor.

Stenius teaches a process for producing a catalyst in a microemulsion (reverse micelle) comprising a hydrocarbon phase (col. 2, ln. 8), a non-ionic surfactant (col. 1, ln. 46), and a noble metal salt aqueous solution (col. 2, ln. 18). A reducing agent is added to the microemulsion to reduce the metal ions to metal crystals inside the microemulsion (col. 3, ln. 32). Stenius then teaches that the reduced metal particles may then be carried on a solid carrier (col. 4, ln. 22).

It would have been obvious to one of ordinary skill in the art at the time of invention to reduce the metal ions to metal particles in Targos's catalyst making method prior to the step of carrying as taught by Stenius in order to produce catalyst metal particles of uniform size (col. 3, ln. 58).

Buchi teaches the use of spray drying as a widely applied technique for quickly drying "aqueous or organic solutions, emulsions etc." (page 2, paragraph 1). Buchi further teaches the use of a closed cycle spray drying system which typically uses an inert gas such as nitrogen in applications where "flammable solvents, toxic products or oxygen sensitive products are processed" (page 4 paragraph 2).

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At the time of the invention, it would have been obvious to use the spray drying system taught by Buchi to dry the catalyst precursor taught by Targos to quickly dry the precursor without losing control of processing temperatures and conditions caused by rapid combustion of the solvent and/or the surfactant in the solution. The motivation for doing so would have been to accelerate the processing time by avoiding a slow air dry while maintaining control over the processing temperatures in catalyst production (page 2 paragraph 1; page 4 paragraph 2).

**As to claim 2**, Targos also teaches the use of a weight ratio range of surfactant to water of about 0.2:1 to 40:1 (column 4 line 15) which, when using a solvent such as polyethylene glycol dodecyl ether, constitutes a molar ratio range of water to surfactant of 0.5:1 to 100:1. The claimed molar ratio of water to surfactant of 20:1 is well within this range and would be an obvious optimization of the range taught in the prior art (See MPEP § 2144.05).

**As to claims 9 and 10**, the catalyst obtained by the obvious process is likewise, considered to be obvious. It is noted that **Claim 10** is patentably identical to claim 9 and will, therefore, be considered jointly with claim 9.

**Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Targos in view of US 4,425,261 (Stenius et al.) and Buchi as applied to claims 1-4 and 6-9 above, and further in view of US 6,413,489 (Ying et al.).**

The process of Targos does not teach the step of carrying comprising preparing a hydroxide to be matured into an oxide forming the substrate and clathrating (surrounding) the catalytic active component by the prepared hydroxide.

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Ying teaches the use of aluminum isopropoxide and barium isopropoxide to produce aluminum and barium hydroxides emulsions (column 7 line 36 and example 2) for use as a carrier for a water-in-oil emulsion to form the catalyst precursor (column 8 line 48). This method yields a high level of control of the particle size of the precursor.

At the time of invention, it would have been obvious to use the hydroxide carrier formation technique taught by Ying to control the particle size of the carrier taught by Targos. The motivation for doing so would be to produce particles of a significantly uniform size while avoiding costly and time consuming milling operations that result in particles of a substantially non-uniform size.

**Claims 1-4 and 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,425,261 (Stenius et al.) in view of US 4,714,693 (Targos) and Training Papers Spray Drying (BUCHI Labortechnik AG, hereafter referred to as Buchi).**

As to **claim 1**, Stenius teaches a process for producing a catalyst in a microemulsion (reverse micelle) comprising a hydrocarbon phase (col. 2, ln. 8), a non-ionic surfactant (col. 1, ln. 46), and a noble metal salt aqueous solution (col. 2, ln. 18). A reducing agent is added to the microemulsion to reduce the metal ions to metal crystals inside the microemulsion (col. 3, ln. 32). Stenius then teaches that the reduced metal particles may then be carried on a solid carrier (col. 4, ln. 22) by adding the microemulsion to a powdered carrier and drying.

Stenius does not disclose spraying the catalyst precursor in an inert gas to dry the catalyst precursor or firing the dried catalyst precursor in air.

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Buchi teaches the use of spray drying as a widely applied technique for quickly drying “aqueous or organic solutions, emulsions etc.” (page 2, paragraph 1). Buchi further teaches the use of a closed cycle spray drying system which typically uses an inert gas such as nitrogen in applications where “flammable solvents, toxic products or oxygen sensitive products are processed” (page 4 paragraph 2).

At the time of the invention, it would have been obvious to use the spray drying system taught by Buchi to dry the catalyst precursor taught by Stenius to quickly dry the precursor without losing control of processing temperatures and conditions caused by rapid combustion of the solvent and/or the surfactant in the solution. The motivation for doing so would have been to accelerate the processing time by avoiding a slow air dry while maintaining control over the processing temperatures in catalyst production (page 2 paragraph 1; page 4 paragraph 2).

Targos discloses a method of making a catalyst composition where a reverse micelle emulsion used to provide isolated micelles of a metal ion containing solution (column 3 line 26) firing the dried catalyst precursor in air (column 6 line 42). The micelles are impregnated onto/into an inorganic oxide particulate carrier such as alumina (column 6 line 19). The new emulsion with the carrier particles is air dried and then fired in air (column 6 line 42).

It would have been obvious to one of ordinary skill in the art at the time of invention to fire the catalyst precursor obtained by the combined method of Stenius and Buchi in air as taught by Targos in order to oxidize the residual organics and carbonaceous deposits from the solvent and surfactant(s) (column 6 line 42).

**As to claim 2**, figure 3 of Stenius shows the relative compositional range of hexane:pentaethyleneglycol dodecylether (PEGDE):water by weight. The molar weight of water

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is ~18 g/mol. The molar weight of PEGDE is ~406.6 g/mol. The figure shows a shaded functional compositional region indicated by L2. Every value of the molar ratio of water:PEGDE in the shaded L2 region is ~10 or less.

**As to claim 3**, Stenius does not disclose a transition or rare earth metal particle being formed in conjunction with his noble metal particle.

Targos discloses a method of making a catalyst composition where a reverse micelle emulsion used to provide isolated micelles of a metal ion containing solution (column 3 line 26) where the metal ions can comprise singly, or in any combination, group VIII metals such as platinum, ruthenium, and palladium (noble metals), group IB-VIIIB metals (transition metals such as Cu, Mn Co, Fe, Ni, and Zn), and Lanthanides such as lanthanum and cerium (column 5 line 25 and examples II-IV).

It would have been obvious to one of ordinary skill in the art at the time of invention to vary the catalyst metal composition according to the combine teachings of Stenius and Targos to produce a variety of catalyst compositions according to the particular catalytic application, desired catalytic activity and mode of operation of the catalyst to provide the most effective and economical catalyst using the combined catalyst production method.

**As to claim 4**, Stenius discloses that pulverulent (powder) alumina may be used as the solid carrier (col. 4, ln. 25).

**As to claim 6**, Stenius discloses the use of noble metals such as platinum, ruthenium, rhodium, iridium, and palladium (col. 2, ln. 29).

**As to claims 7 and 8**, Targos discloses the use (singly or in combination) of group VIII metals such as platinum, ruthenium, and palladium (noble metals), group IB-VIIIB metals



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(transition metals such as Cu, Mn Co, Fe, Ni, and Zn), and Lanthanides such as lanthanum and cerium (column 5 line 25 and examples II-IV).

**As to claim 9**, the catalyst obtained by the above obvious process is likewise, considered to be obvious.

**Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stenius et al. in view of Targos and Buchi as applied to claims 1-4 and 6-9 above, and further in view of US 6,413,489 (Ying et al.).**

The process of Stenius does not teach the step of carrying comprising preparing a hydroxide to be matured into an oxide forming the substrate and clathrating (surrounding) the catalytic active component by the prepared hydroxide.

Ying teaches the use of aluminum isopropoxide and barium isopropoxide to produce aluminum and barium hydroxides emulsions (column 7 line 36 and example 2) for use as a carrier for a water-in-oil emulsion to form the catalyst precursor (column 8 line 48). This method yields a high level of control of the particle size of the precursor.

At the time of invention, it would have been obvious to use the hydroxide carrier formation technique taught by Ying to control the particle size of the carrier taught by Stenius. The motivation for doing so would be to produce particles of a significantly uniform size while avoiding costly and time consuming milling operations that result in particles of a substantially non-uniform size.

***Allowable Subject Matter***

Claims 11-19 are allowed.

The following is an examiner's statement of reasons for allowance: the limitation in claim 11 requiring an emulsion for producing the noble metal particle and a separate emulsion for producing the transition metal particle which solutions are combined post-reduction is only found to be taught in a prior issued patent commonly owned by the assignee of the current application. The filing date of the prior issued patent is less than one year earlier than the effective filing date of the current application. No double patenting situation exists because the current claim 11 requires firing in air whereas the prior issued patent catalyst composition must be calcined in an inert atmosphere to prevent oxidation of the carbon support.

The examiner suggests that applicant amend claim 1 to include the requirement that the reducing agent be added as a reversed micellar solution containing an aqueous solution of the reducing agent in order to put claims 1-9 in condition for allowance.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Response to Arguments***

Applicant's arguments, see page 1, line 14 and so forth, filed 09/10/2009, with respect to the rejection(s) of claim(s) 1-10 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration,

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a new ground(s) of rejection is made in view of the disclosures of US 4,714,693 (Targos), US 4,425,261 (Stenius et al.), Training Papers Spray Drying (BUCHI Labortechnik AG, hereafter referred to as Buchi), and US 6,413,489 (Ying et al.) as described above.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JARED WOOD whose telephone number is (571)270-5911. The examiner can normally be reached on Monday - Friday, 7:30 am - 5:00 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571)272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JARED WOOD/  
Examiner, Art Unit 1793

/J.A. LORENZO/  
Supervisory Patent Examiner, Art Unit  
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